An Analysis of Ethernet Access Options under NECA 5

Overview

The extensive duplication of local access networks for most competitors is economically infeasible. Although competitors can deploy new facilities to targeted multi-tenant buildings, any widespread competition requires the availability of a reasonably priced access connection from the incumbent. Traditionally, competitors have relied upon standard TDM access circuits (DS1 and DS3) to connect customers to their local networks. As the nation transforms to a universal packet network, however, a modern wholesale Ethernet access (with transport) is necessary for competition to flourish. Although such an offering is most needed in the nation's urban and suburban markets served by the Bell Operating Companies (BOCs), it is the smaller rural ILECs that have introduced just such a service in their collective special access tariff (NECA #5). The purpose of this analysis is to compare this modern Ethernet access option to the far more limited (and overpriced) special access offerings of the BOCs.

Ethernet Transport Service (ETS)

NECA Access Service FCC Tariff #5 provides Ethernet access and transport services (ETS) at monthly, one-year, three-year and volume pricing plans.[1] ETS provides end-to-end transport at speeds ranging from 2 Mbps to 1 Gbps (where available). At speeds above 50 Mbps, a fiber loop is required. ETS is used for broadband transport using variable length Ethernet packets with the ability to interconnect multiple locations using the Telephone Company's ETS network.

Ethernet packets generated by Ethernet-compatible customer premises equipment (CPE) are transmitted using available capacity on shared transmission paths through the Telephone Company's ETS network to a pre-specified destination as shown in Figure 1. ETS can be used, for example, to interconnect a DSL-ASCP[2] in one ETS Serving Wire Center (SWC) to a telecommunications service provider (TSP) point of presence served by a different ETS SWC.

[1] Section 16.3 of NECA 5.

[2] Digital Subscriber Line - Access Service Connection Point as defined in Section 8.1.1 of NECA 5.

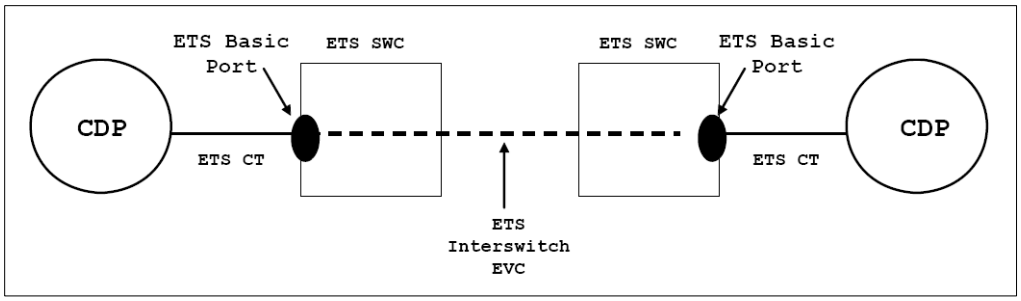

Figure 1 - ETS Service between Serving Wire Centers (ETS comprises shared transport)

ETS comprises an ETS Channel Termination (ETS CT on left of diagram), which connects a Customer Designated Premises (CDP – ex. end-user premises) to a basic ETS port at its SWC. The ETS Port is connected to an ETS Ethernet Virtual Connection (EVC), which provides the connectivity and shared transport to a distant SWC (if different than the initial SWC) and ETS Port serving the TSP point of presence. Finally, the distant ETS Port is connected, via the ETS Channel Termination to the second CDP (ex. TSP point of presence).[3]

In its "default" state, the transmission quality of ETS is not guaranteed and is offered to ETS customers at a best effort level.[4] In this default form, ETS cannot provide the foundational elements necessary to deploy a deterministic network such as that necessary to guarantee quality of service (QoS) in a Managed Networks. However, the TSP can order Class of Service (CoS) prioritization for ETS EVCs contained within a NECA carrier's operating territory, which allows the TSP to prioritize its own traffic and affect the way in which that traffic is supported throughout the NECA carrier's ETS network.[5] Each CoS is ordered with a bandwidth allocation, the sum of which cannot exceed the bandwidth of the associated EVC.[6]

Terms & Pricing

ETS pricing is principally determined by the speed requested for both the ETS EVCs and CTs; the distance between the SWCs when one SWC does not serve both CDPs; and, the distance between the SWC and CDP (i.e. over or under 300 feet). The price of the ETS CT is also determined by the "Rate Band" of the ETS SWC, which is meant to accommodate the differences in operating costs (for whatever

[3] The ETS Port can, optionally, be connected to a DSL Access Connection, which aggregates TSP xDSL subscriber lines.

[4] Section 16.3.2 of NECA 5.

[5] Carrier-recognized Classifications are: Real Time, Near Real Time and Other. All values, however, will be passed.

[6] The tariff effectively describes a deterministic service, although it does not provide a specified service level agreement or incorporate a penalty system for failing to achieve performance metrics.

reason) between different NECA carriers. The analysis below focuses on Rate Band 1, since that is the rate band most similar to the suburban and/or urban markets served by the BOCs to which the prices are compared.[7]

The minimum service period for ETS Ports and CTs is twelve months. The minimum service period for all other ETS elements is one month. Length of term percentage-based discounts are available for 36-month and 60-month commitments. Volume discounts are also provided.

The basic rate elements, rates and discount structures for ETS service are identified in Appendix A.

Comparison of ETS to BOC Special Access Pricing

NECA 5 offers ETS service in many configurations. The configurations applicable to our area of interest (Subscriber Access) however, are fairly straight-forward. Pricing is mostly affected by the configuration of how and where a TSP accepts a hand-off of the service. The analysis below assumes the typical configurations of interconnection to ETS Channel Terminations at a collocation within a SWC.[8] See Figure 2 below, which depicts a subscriber (the CDP on the left) interconnecting to a TSP collocation facility (the CDP on the right) within the same serving wire center.

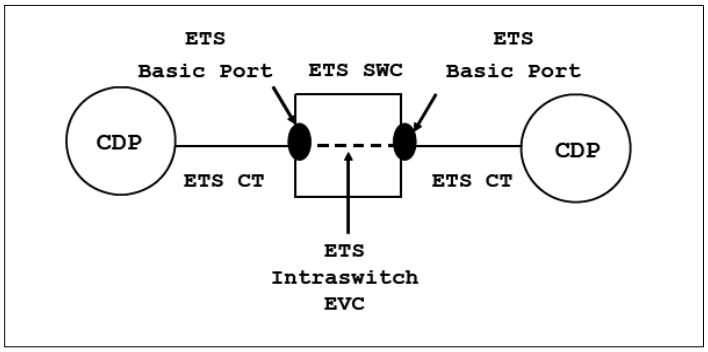

Figure 2 - ETS configured as Ethernet Access Line

Using this Ethernet Subscriber Access Line configuration, we compare the prices of the ETS service offering available under NECA 5 to those of Ethernet and TDM offerings from AT&T, Verizon,

[7] As a practical matter, comparing Rate Band 1 prices to BOC special access services is most favorable to the BOCs, whose suburban and urban markets would likely enjoy lower costs than the rural ILECs that concur in NECA 5.

[8] In this way the analysis focuses on the difference in access network prices between ETS, configured as a Subscriber Ethernet Access Line, and RBOC Special Access without considering additional complexities such as backhaul.

CenturyLink (Qwest) and CenturyLink (Non-Quest), which would produce functionality approximately equal to that of ETS.[9]

Figures 3 – 6 show the monthly charge per unit (i.e. the charge per subscriber access line), by service provider, for each of the Ethernet subscriber access line speeds listed in the left-hand column. Column 2 shows the prices available under NECA 5 for such access lines. Columns 3 – 4 show the prices of any comparable Ethernet offerings of the service provider (to the extent available) and the ratio of those prices to the prices of NECA 5 services. Columns 6 – 9 show the composite cost of TDM services required to create a comparable access line offering of the speed described in column 1, using techniques such as TDM bonding and Link Aggregation Groups (LAGs). Column 5 indicates the actual facilities used to achieve each speed of access line.

AT&T Monthly Cost Comparison (Collocation Hand-off)	**Service Type - Monthly Charge Per Access Line**							
	NECA 5 Ethernet Transport Service	**Switched Ethernet Service**	% Above NECA 5 Rates	**TDM Approximate Speed Equivalent**	**Rate Capped Special Access (TDM)**	% Above NECA 5 Rates	**Pricing Flexibility Rates (TDM)**	% Above NECA 5 Rates
2 Mbps	$ 149	$ 1,943	1200%	1 x DS1	$ 190	27%	$ 196	31%
5 Mbps	$ 157	$ 2,064	1217%	3 x DS1	$ 570	264%	$ 588	275%
10 Mbps	$ 165	$ 2,192	1227%	6 x DS1	$ 1,140	590%	$ 1,176	612%
20 Mbps	$ 188	$ 2,794	1386%	13 x DS1	$ 2,470	1213%	$ 2,548	1255%
50 Mbps	$ 223	$ 3,206	1339%	1 x DS3	$ 2,200	887%	$ 2,370	963%
100 Mbps	$ 252	$ 3,822	1414%	2 x DS3	$ 4,400	1643%	$ 4,740	1778%
250 Mbps	$ 384	$ 6,230	1522%	6 x DS3	$ 13,200	3338%	$ 14,220	3603%
500 Mbps	$ 548	$ 8,450	1443%	11 x DS3	$ 24,200	4320%	$ 26,070	4661%
750 Mbps	$ 693	$ 11,280	1527%	17 x DS3	$ 37,400	5294%	$ 40,290	5711%
1000 Mbps	$ 847	$ 12,960	1430%	23 x DS3	$ 50,600	5872%	$ 54,510	6334%

Figure 3 - Comparison of ETS to AT&T Ethernet and TDM services[10]

The comparisons in Figure 3 show that even the Ethernet offerings of AT&T are not price competitive with those of the NECA service providers. The AT&T services exceed the NECA 5 services with price ratios ranging from a low of 1,200% to a high of more than 1,500%. The TDM speed-equivalent services, under rate cap, show an even greater ratio range, topping out at almost 5,900% of the comparable NECA 5 service. The rates in areas where AT&T enjoys price flexibility are the highest rates for comparable service with a range of prices exceeding 6300% of the NECA 5 rates at the highest speed.

[9] This is not to say that the Ethernet/Special Access services of the RBOCs are equal to ETS services. ETS is a more sophisticated wholesale offering, permitting such functionality as traffic prioritization, rate shaping, traffic policing, rate limiting, VLAN tagging, Class of Service-based traffic handling and hand-off to other participating carriers, etc. that raise the offering to that of a true wholesale service. The Ethernet services offered by AT&T, Verizon and CenturyLink do not begin to approach that level of flexible inter-operability and are more representative of a retail, end-user service. (See NECA 5, Section 16.3)

[10] AT&T rates for Switched Ethernet Service can be found in the AT&T Interstate Access Guidebook, Part 5, Section 4. AT&T rate-capped special access prices can be found in AT&T (AIT) Tariff FCC #2, Sections 7.5.9(B)1 and 7.5.9(C)1. AT&T pricing flexibility access rates can be found in AT&T (AIT) Tariff FCC #2, Sections 21.5.2.7.1(A) and 21.5.2.7.1(B).

Verizon Monthly Cost Comparison (Collocation Hand-off)	Service Type - Monthly Charge Per Access Line							
	NECA 5 Ethernet Transport Service	Transparent LAN Service	% Above NECA 5 Rates	TDM Approximate Speed Equivalent	Rate Capped Special Access (TDM)	% Above NECA 5 Rates	Pricing Flexibility Rates (TDM)	% Above NECA 5 Rates
2 Mbps	$ 149	Available only under private contract at undisclosed rates		1 x DS1	$ 197	32%	$ 239	60%
5 Mbps	$ 157			3 x DS1	$ 591	277%	$ 718	358%
10 Mbps	$ 165			6 x DS1	$ 1,182	615%	$ 1,435	768%
20 Mbps	$ 188			13 x DS1	$ 2,561	1262%	$ 3,109	1553%
50 Mbps	$ 223			1 x DS3	$ 2,310	936%	$ 3,207	1339%
100 Mbps	$ 252			2 x DS3	$ 4,200	1564%	$ 6,063	2302%
250 Mbps	$ 384			6 x DS3	$ 8,700	2166%	$ 10,844	2724%
500 Mbps	$ 548			11 x DS3	$ 14,025	2461%	$ 15,391	2711%
750 Mbps	$ 693			17 x DS3	$ 20,400	2842%	$ 24,579	3445%
1000 Mbps	$ 847			23 x DS3	$ 25,415	2900%	$ 29,634	3398%

Figure 4 - Comparison of ETS to Verizon Ethernet and TDM services[11]

The comparisons in Figure 4 first indicate the fact that Verizon does not publish pricing for its Transparent LAN Service so it is not possible to compare those prices to the NECA 5 prices. The TDM speed-equivalent services under rate cap show a similar story to AT&T, with price differences topping out at 2,900% of the comparable NECA 5 service. The rates in areas where Verizon enjoys price flexibility are, again, the highest rates for comparable service with a range of prices nearing 3,400% of the NECA 5 rates at the highest speed.

CenturyLink (Qwest) Monthly Cost Comparison (Collocation Hand-off)	Service Type - Monthly Charge Per Access Line							
	NECA 5 Ethernet Transport Service	Metro Optical Ethernet (MOE)	% Above NECA 5 Rates	TDM Approximate Speed Equivalent	Rate Capped Special Access (TDM)	% Above NECA 5 Rates	Pricing Flexibility Rates (TDM)	% Above NECA 5 Rates
2 Mbps	$ 149	$ 1,048	601%	1 x DS1	$ 109	-27%	$ 156	4%
5 Mbps	$ 157	$ 1,154	636%	3 x DS1	$ 327	109%	$ 468	199%
10 Mbps	$ 165	$ 1,321	699%	6 x DS1	$ 654	296%	$ 936	466%
20 Mbps	$ 188	$ 1,510	703%	13 x DS1	$ 1,416	653%	$ 2,028	978%
50 Mbps	$ 223	$ 2,121	852%	1 x DS3	$ 1,400	528%	$ 2,100	842%
100 Mbps	$ 252	$ 2,729	981%	2 x DS3	$ 2,800	1009%	$ 4,200	1564%
250 Mbps	$ 384	$ 5,363	1297%	6 x DS3	$ 8,400	2088%	$ 12,600	3181%
500 Mbps	$ 548	$ 7,397	1251%	11 x DS3	$ 15,400	2713%	$ 23,100	4119%
750 Mbps	$ 693	$ 10,448	1407%	17 x DS3	$ 23,800	3333%	$ 35,700	5049%
1000 Mbps	$ 847	$ 12,481	1373%	23 x DS3	$ 32,200	3701%	$ 48,300	5601%

Figure 5 - Comparison of ETS to CenturyLink (Qwest) Ethernet and TDM services[12]

[11] Verizon rates for its Transparent LAN Service are undisclosed. Verizon rate-capped special access prices can be found in Verizon Tariff FCC #1, Sections 7.5.9(A)1. Verizon pricing flexibility access rates can be found in Verizon Tariff FCC #1, Sections 7.5.9(A)1. The lowest cost Price Band (Price Band 4) was used in this analysis.

[12] CenturyLink (Qwest) rates for its Metro Optical Ethernet service can be found in the Qwest Corporation Rates and Services Schedule Interstate No. 1, Section 8.8.4. CenturyLink (Qwest) rate-capped special access prices can be found in Qwest Corporation Tariff F.C.C. No. 1, Section 7.11.4 and 7.12.4. CenturyLink (Qwest) pricing flexibility access rates can be found in Qwest Corporation Tariff F.C.C. No. 1, Section 17.2.11 and 17.2.12. The lowest cost Zone (Zone 1) was used in this analysis.

The comparisons in Figure 5 show that the Ethernet offerings of CenturyLink (Qwest) are not price competitive with those of the NECA service providers. The CenturyLink (Qwest) services exceed the NECA 5 services by ratios ranging from a low of more than 600% to a high of more than 1,400%. The TDM speed-equivalent services, under rate cap, show an even greater range ratio, topping out at more than 3,700% of the comparable NECA 5 service. The rates in areas where CenturyLink (Qwest) enjoys price flexibility are the highest rates for comparable service with a range of prices exceeding ratios of 5,600% compared to the NECA 5 rates at the highest speed.

CenturyLink (Non-Qwest) Monthly Cost Comparison (Collocation Hand-off)	**Service Type - Monthly Charge Per Access Line**							
	NECA 5 Ethernet Transport Service	**Ethernet Virtual Private Line**	% Above NECA 5 Rates	**TDM Approximate Speed Equivalent**	**Rate Capped Special Access (TDM)**	% Above NECA 5 Rates	**Pricing Flexibility Rates (TDM)**	% Above NECA 5 Rates
2 Mbps	$ 149	$ 807	440%	1 x DS1	$ 212	42%	$ 257	72%
5 Mbps	$ 157	$ 997	536%	3 x DS1	$ 636	306%	$ 771	392%
10 Mbps	$ 165	$ 1,013	513%	6 x DS1	$ 1,272	670%	$ 1,542	833%
20 Mbps	$ 188	$ 1,161	517%	13 x DS1	$ 2,756	1365%	$ 3,341	1677%
50 Mbps	$ 223	$ 1,745	683%	1 x DS3	$ 3,350	1403%	$ 3,404	1427%
100 Mbps	$ 252	$ 2,336	825%	2 x DS3	$ 6,700	2555%	$ 6,808	2597%
250 Mbps	$ 384	$ 3,136	717%	6 x DS3	$ 20,100	5135%	$ 20,424	5219%
500 Mbps	$ 548	$ 4,468	716%	11 x DS3	$ 36,850	6630%	$ 37,444	6738%
750 Mbps	$ 693	$ 6,464	832%	17 x DS3	$ 56,950	8114%	$ 57,868	8246%
1000 Mbps	$ 847	$ 7,290	760%	23 x DS3	$ 77,050	8994%	$ 78,292	9141%

Figure 6 - Comparison of ETS to CenturyLink (Non-Qwest) Ethernet and TDM services[13]

The comparisons in Figure 6 show that the Ethernet offerings of CenturyLink (Non-Qwest companies) are not price competitive with those of the NECA service providers. The CenturyLink (Non-Qwest) services exceed the NECA 5 services by ratios ranging from a low of 440% to a high of more than 830%. The TDM speed-equivalent services, under rate cap, show an even greater range ratio, topping out at almost 9,000% of the comparable NECA 5 service. The rates in areas where CenturyLink (Non-Qwest) enjoys price flexibility are the highest rates for comparable service with a range of prices exceeding ratios of 9,100% compared to the NECA 5 rates at the highest speed.

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[13] CenturyLink (Non-Qwest) rates for its Ethernet Virtual Private Line service can be found in the CenturyLink Operating Companies Tariff F.C.C. #9, Section 7.5.18. CenturyLink (Non-Qwest) rate-capped special access prices can be found in the CenturyLink Operating Companies Tariff F.C.C. #9, Section 7.5.8(A)1 and Section 7.5.8(A)2 (Virginia). CenturyLink (Non-Qwest) pricing flexibility access rates can be found in the CenturyLink Operating Companies Tariff F.C.C. #9, Section 22.5.8(A)1 and Section 22.5.8(A)2. The lowest cost Zone (Zone 1) was used in this analysis.

Summary

The NECA 5 tariff offers very compelling pricing for ETS service when used as a (functionally superior) alternative to RBOC Special Access services and rates. The current offerings from AT&T, Verizon and CenturyLink not only lack competitive pricing but, compared to the ETS offering made available under NECA 5, offer abbreviated functionality, less service flexibility and few options for interconnection supportive of Managed Networks.

Appendix A

Ethernet Transport Service

ETS Channel Termination < 300 Feet		
Bi-directional Speed	**Non-recurring**	**Monthly**
2 Mbps		$ 43.45
5 Mbps		$ 53.33
10 Mbps		$ 61.59
20 Mbps	$ 295.00	$ 67.60
50 Mbps		$ 81.13
100 Mbps		$ 90.14
250 Mbps		$ 128.38
500 Mbps		$ 168.26
750 Mbps	$ 442.00	$ 195.52
1 Gbps		$ 223.83

ETS Channel Termination > 300 Feet		
Bi-directional Speed	**Non-recurring**	**Monthly**
2 Mbps		$ 110.20
5 Mbps		$ 111.42
10 Mbps		$ 113.00
20 Mbps	$ 295.00	$ 127.84
50 Mbps		$ 149.98
100 Mbps		$ 160.25
250 Mbps		$ 227.13
500 Mbps		$ 300.47
750 Mbps	$ 442.00	$ 345.63
1 Gbps		$ 400.62

ETS Basic Port			
Bi-directional Speed	**Non-recurring**	**Monthly**	**DSL-ASC One-time**
2 Mbps		$ 55.30	
5 Mbps		$ 61.22	
10 Mbps		$ 67.60	
20 Mbps	$ 259.00	$ 75.11	$ 150.00
50 Mbps		$ 82.63	
100 Mbps		$ 90.14	
250 Mbps		$ 124.43	
500 Mbps		$ 157.74	
750 Mbps	$ 388.00	$ 199.48	$ 225.00
1 Gbps		$ 240.37	

ETS EVC (Intraswitch)		
Bi-directional Speed	**Non-recurring**	**Monthly**
2 Mbps		$ -
5 Mbps		$ -
10 Mbps		$ -
20 Mbps	$ 205.00	$ -
50 Mbps		$ -
100 Mbps		$ -
250 Mbps		$ -
500 Mbps		$ -
750 Mbps	$ 307.00	$ -
1 Gbps		$ -

ETS EVC (Interswitch)		
Bi-directional Speed	**Non-recurring**	**Monthly**
2 Mbps		$ 23.70
5 Mbps		$ 32.05
10 Mbps		$ 60.09
20 Mbps	$ 205.00	$ 120.18
50 Mbps		$ 168.26
100 Mbps		$ 268.41
250 Mbps		$ 553.00
500 Mbps		$ 921.43
750 Mbps	$ 307.00	$ 1,224.51
1 Gbps		$ 1,602.48

CoS - Monthly Per Mbps (Intraswitch)		
Bi-directional Speed	**Near Realtime**	**Real Time**
2 Mbps		
5 Mbps	$ 0.24	$ 0.48
10 Mbps		
20 Mbps		
50 Mbps		
100 Mbps	$ 0.14	$ 0.27
250 Mbps		
500 Mbps		
750 Mbps	$ 0.08	$ 0.16
1 Gbps		

CoS - Monthly Per Mbps (Interswitch)		
Bi-directional Speed	**Near Realtime**	**Real Time**
2 Mbps		
5 Mbps	$ 0.79	$ 1.58
10 Mbps		
20 Mbps		
50 Mbps		
100 Mbps	$ 0.49	$ 0.99
250 Mbps		
500 Mbps		
750 Mbps	$ 0.30	$ 0.59
1 Gbps		

Term and Volume Discounts	
Commitment	**Discount**
36-Month Term	10%
60-Month Term	20%
More than 4 ETS Ports in service	10%